

# New Web-Based Capabilities to Support the Management of Nutrients in Receiving Waters

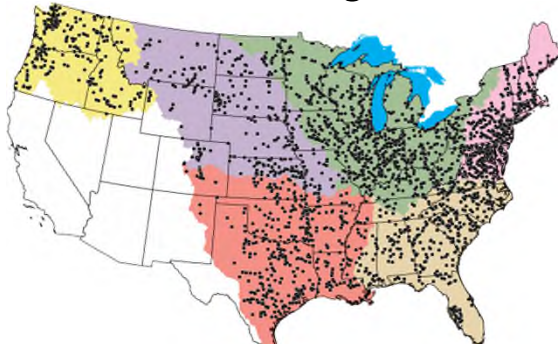
Stephen D. Preston  
National Water Quality Assessment Program  
U.S. Geological Survey



# SPARROW Water-Quality Model

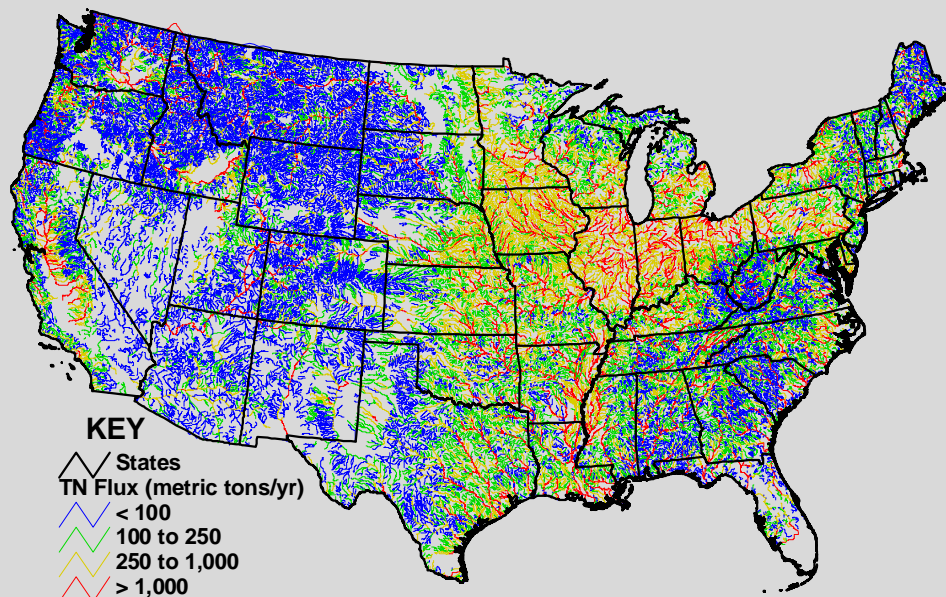
*SPAtially Referenced Regression on Watershed Attributes)*

Monitoring Data



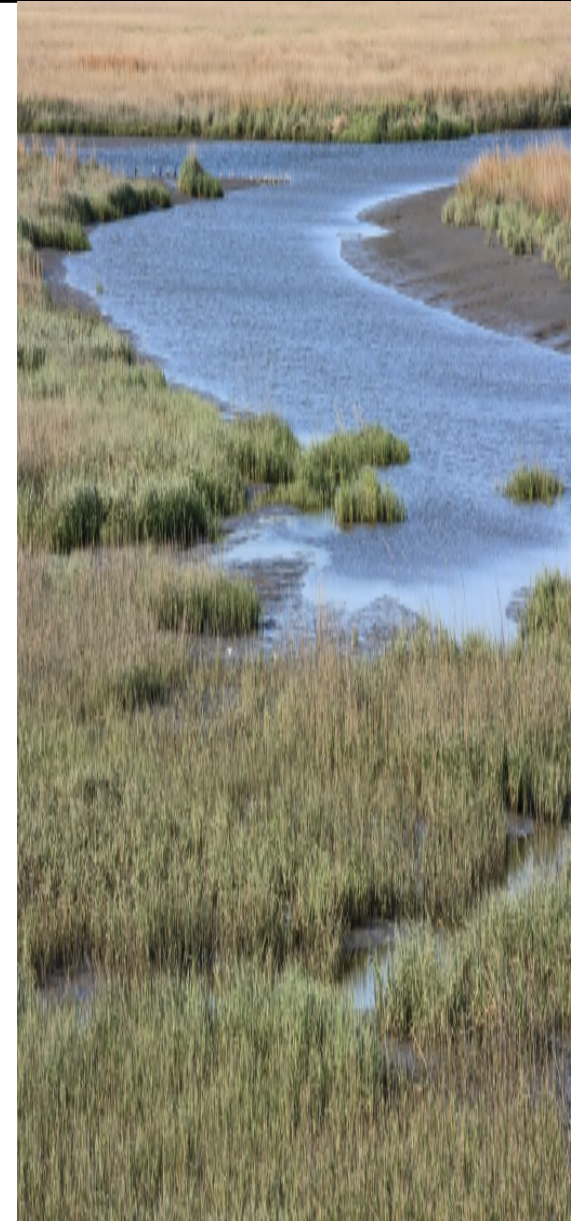
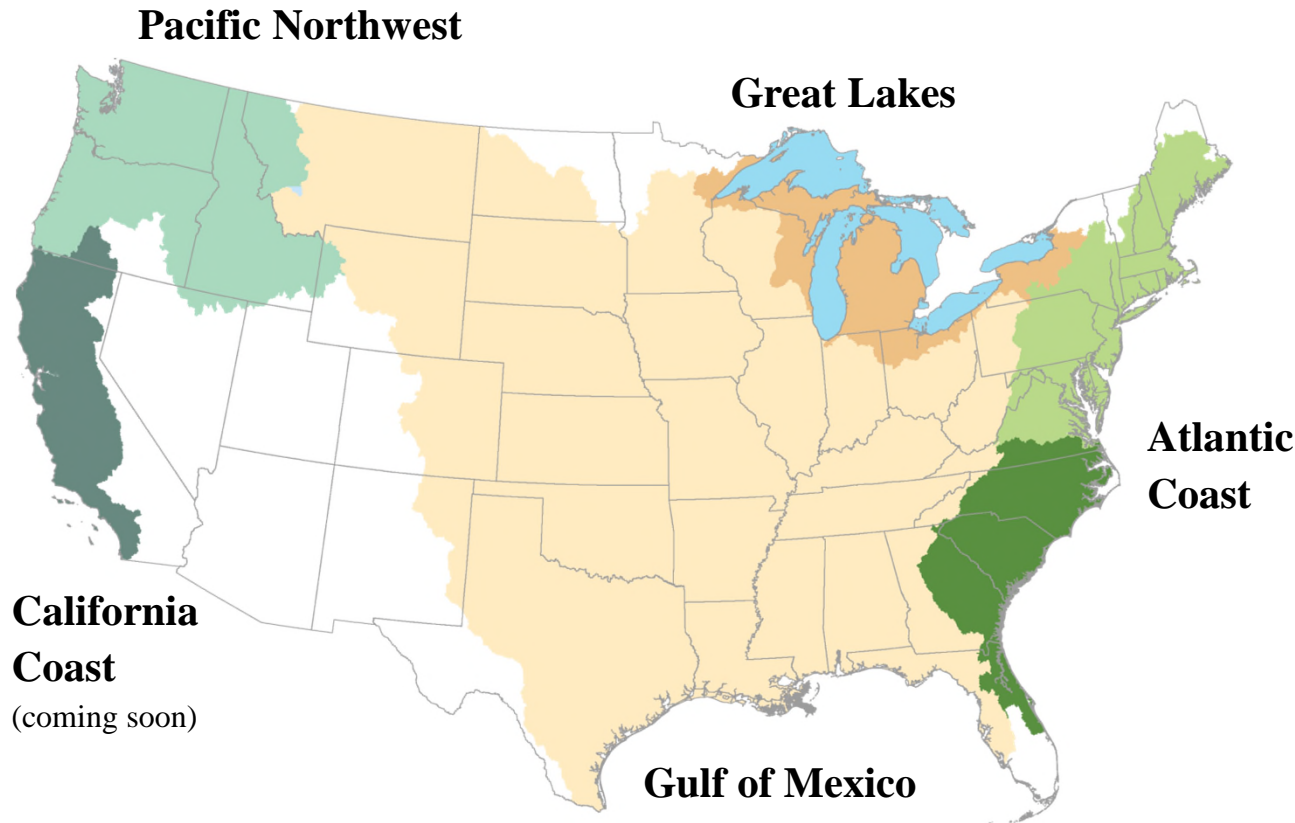
# How SPARROW Models Can Inform Nutrient Management Decisions

## SPARROW Predictions of Stream Nitrogen Flux



- Predict mean-annual flux, yield and concentration for unmonitored streams
- Predict contaminant flux to downstream receiving waters such as estuaries
- Apportion stream loads to major nutrient sources and upstream watersheds
- Provide a framework for prioritizing areas for management actions
- Evaluate the potential effects of landscape change scenarios on water quality

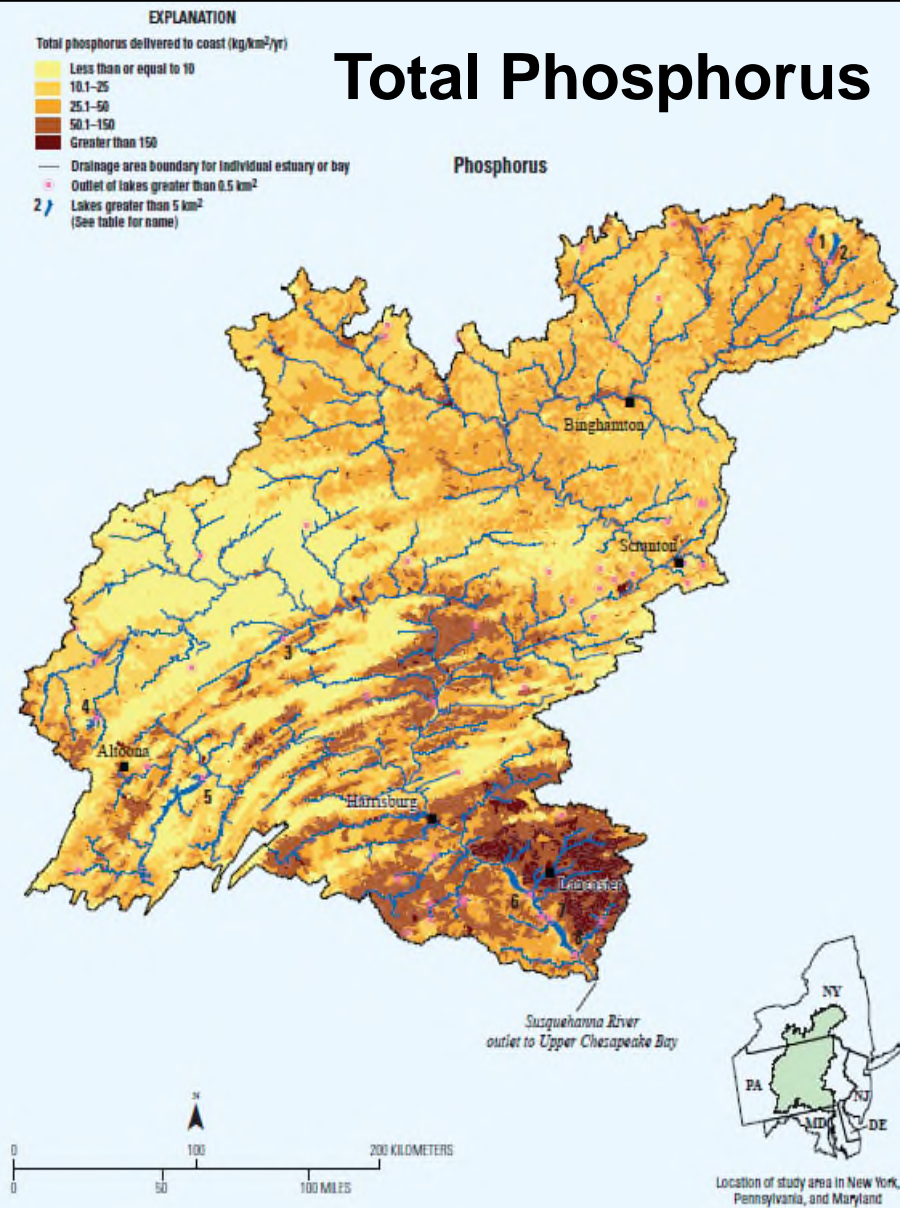
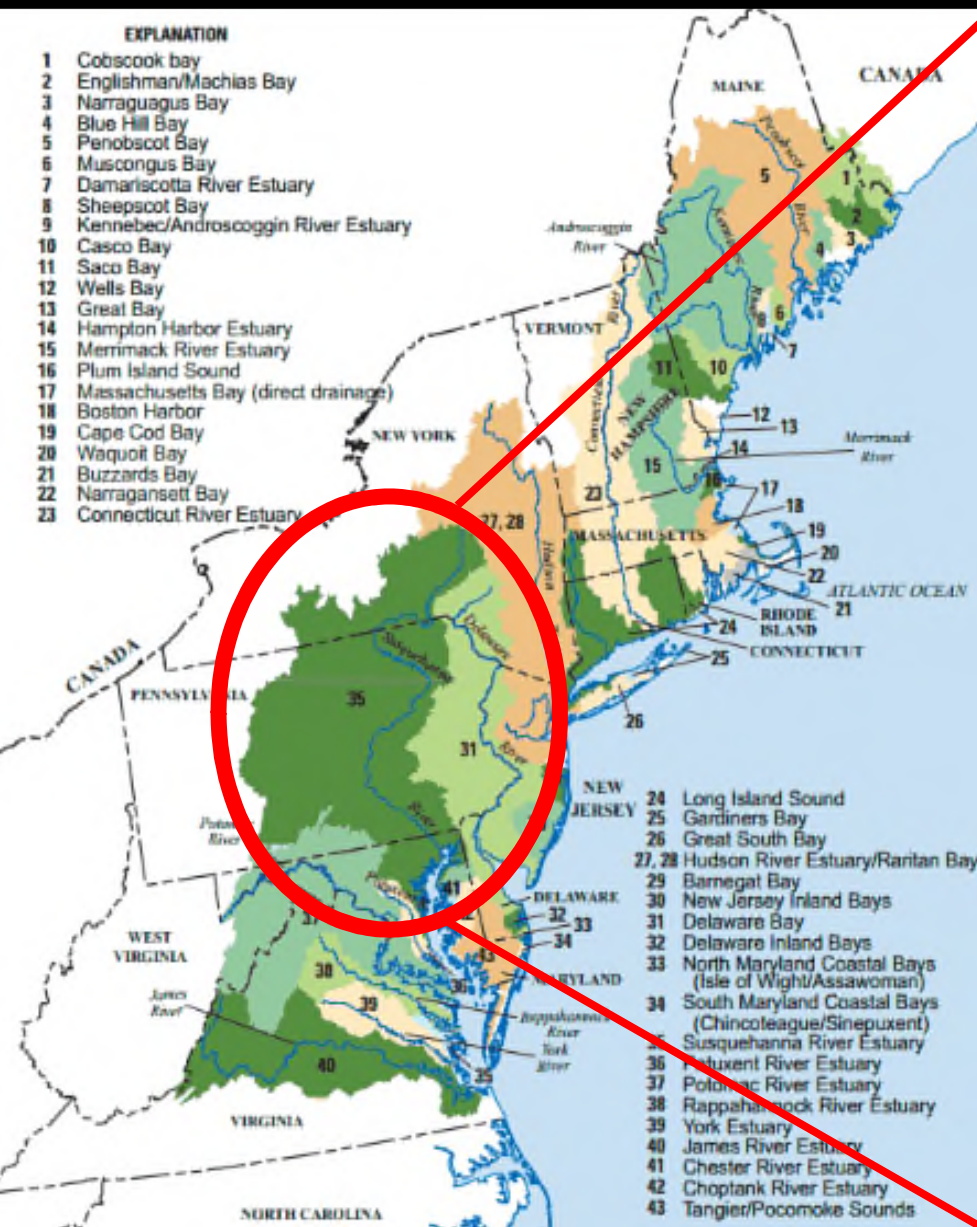
# Tracking Nutrient Loading to the Nation's Estuaries and Great Lakes



<http://water.usgs.gov/nawqa/sparrow/estuary>



# Nutrient Loading Summary Page - Northeast



# Example Estuary Summary

## Tabular Summary of Loads to Receiving Waters

Total phosphorus	Source shares, in percent <sup>a</sup>					Total load, kg/yr	Total yield, kg/km <sup>2</sup> /yr <sup>c</sup>
	Wastewater <sup>b</sup>	Urban land	Fertilizer	Manure	Background		
Estuaries and other coastal waterbodies							
Upper Chesapeake Bay (Susquehanna River Basin only)	24	11	22	23	19	3,056,500	42.9
Total from all tributaries to Chesapeake Bay, including Susquehanna River	26	12	25	21	16	8,034,765	47.1
Major lakes							
1. Canadarago Lake, NY	1	12	28	23	37	4,231	25.5
2. Otsego Lake, NY	0	13	28	19	39	3,427	17.0
3. Foster Joseph Sayers Lake, PA	13	21	31	17	18	22,572	25.7
4. Glendale Lake, PA	0	11	49	13	27	2,080	19.2
5. Raystown Lake, PA	2	17	31	26	24	58,079	23.4
6. Lake Clarke, PA	27	12	20	19	21	2,642,597	39.1
7. Lake Aldred, PA	26	11	21	22	20	2,914,704	42.0
8. Conowingo Reservoir, MD	25	11	21	22	20	2,952,418	42.1



# SPARROW Decision Support System



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## SPARROW Decision Support System

### Find a Model by Geographic Location:

Select a region or state. When a state is selected, all models containing that state are listed.



Maryland ▼

### Find a Model by Modeled Constituent:

Nitrogen ▼

Models matching your criteria (click a model to show details)

[Chesapeake Bay Total Nitrogen Model - 2002](#)

[National Total Nitrogen Model - 1992](#)

[Total Nitrogen Model for the New England and Mid-Atlantic Region - 2002](#)

### Documentation and Further Reading

- [What is SPARROW?](#)
- [What is SPARROW Decision Support?](#)
- [SPARROW Applications & Documentation](#)
- [SPARROW DSS FAQs](#)

### Tutorial Videos

Select a video... ▼

[Watch now >>](#)

### Found a bug or have a comment?

Please send bugs, suggestions and questions to the [SPARROW Decision Support System Administrator](#).

### Selected Model

#### 2002 Total Nitrogen Model for the Chesapeake Bay Watershed



[Explore this model in the Decision Support System >>](#)

**Modeled Constituent:** Nitrogen

**Base Year:** 2002

**Stream Network:** National Hydrography Dataset Plus  
Geometry and additional reach and network attribute data are available with the stream network data, which is available as a separate download.

**Reference:** [Sources, Fate, and Transport of Nitrogen and Phosphorus in the Chesapeake Bay Watershed: An Empirical Model](#)

**Model Updates:** [View this model's updates](#)

### Watershed Based Sessions

To start the DSS with the outlet river reach of a major watershed selected for downstream tracking, select a watershed and click Go.

Susquehanna River Watershed ▼ [Go >>](#)

### Scenario Based Sessions

To start the DSS with a predefined scenario, click on the link for one of the scenarios below.

[Accessibility](#) [FOIA](#) [Privacy](#) [Policies and Notices](#)

U.S. Department of the Interior | U.S. Geological Survey

URL: <http://water.usgs.gov/nawqa/sparrow/dss/>

Page Contact Information: [SPARROW DSS Administrator](#)

Page Last modified: 04/11/2014 11:50:41 (Version: 1.4.32.21 (04/11/2014 11:50:41) - Release)



# SPARROW DSS – “Display Results”

Pre

**SPARROW Decision Support System** Total Nitrogen

**Display Results** Downstream Tracking Change Inputs Find a Reach Export Data

View the model results by reach or catchment.

**1. Select a Data Series**  
Data Series  
Incremental Yield  
Comparison To Original Model  
Do Not Compare

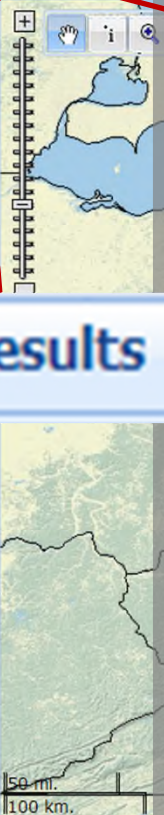
**2. Select a Model Source**  
Model Source  
Urban Area  
Map Units:

**3. Select the Display:**  
☐ Reaches  
☒ Catchments  
☒ Reach Overlay  
☐ HUC8 Overlay

Binning for Map Color and Legend  
5 Custom Bins  
☐ Auto binning [Edit Custom Bins...](#)

Currently mapping **Incremental Yield**.  
The map is up to date.

[Update Map](#)



## 1. Select a Data Series

### Data Series

Incremental Yield

### Comparison To Original Model

Do Not Compare

## 2. Select a Model Source

### Model Source

Urban Area

**Display Results**

**Downstream Tracking**

**Change Inputs**

## 3. Select the map display options

### Display: ☐ Reaches ☒ Catchments

☐ Calibration Sites

☒ Reach Overlay

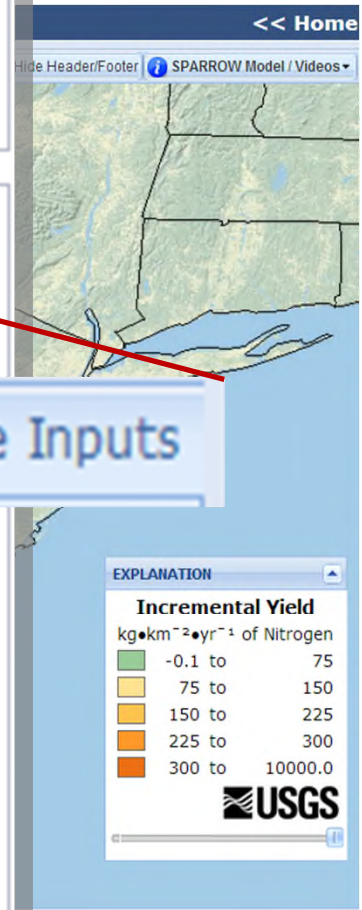
☐ HUC8 Overlay

### Binning for Map Color and Legend

5 Custom Bins

☐ Auto binning

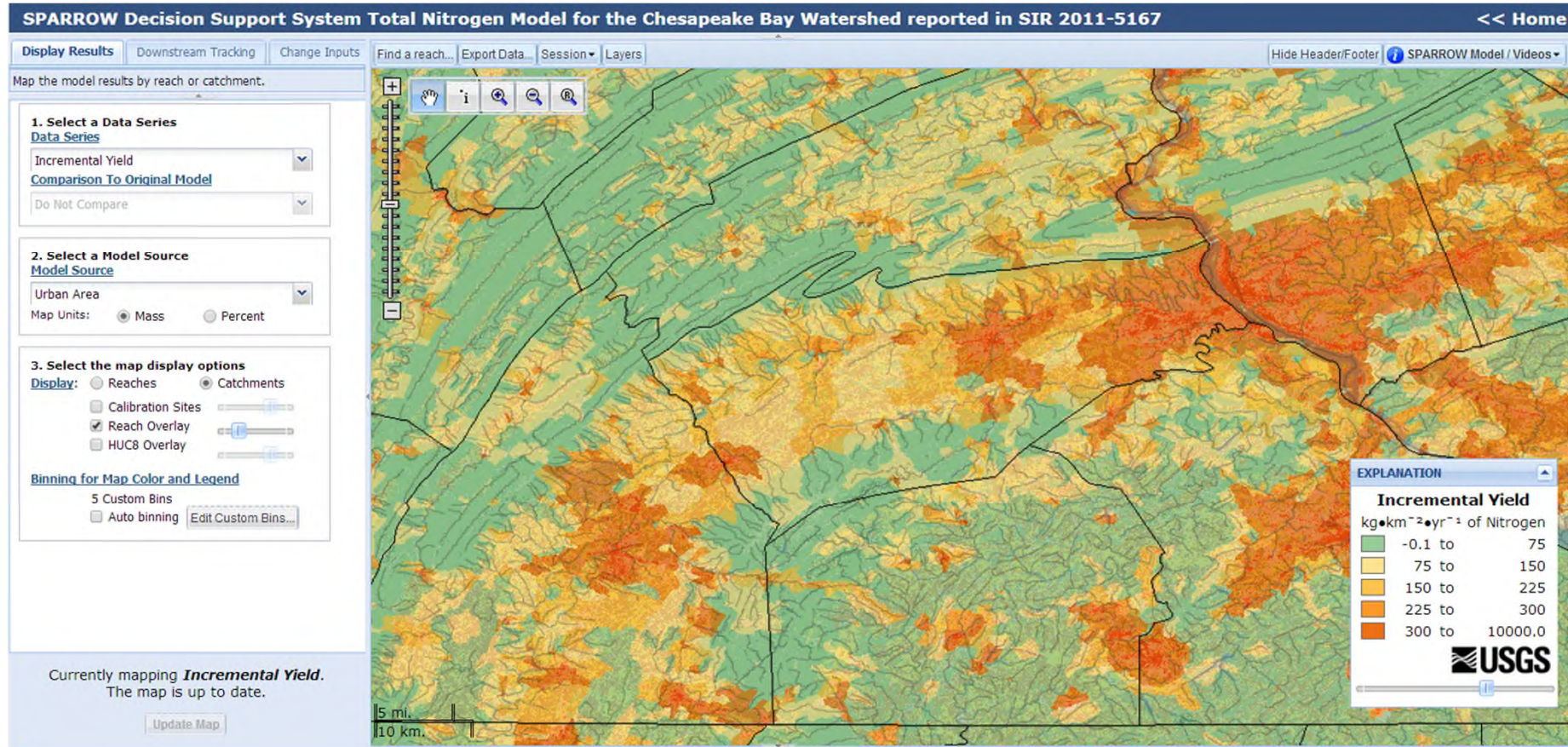
[Edit Custom Bins...](#)





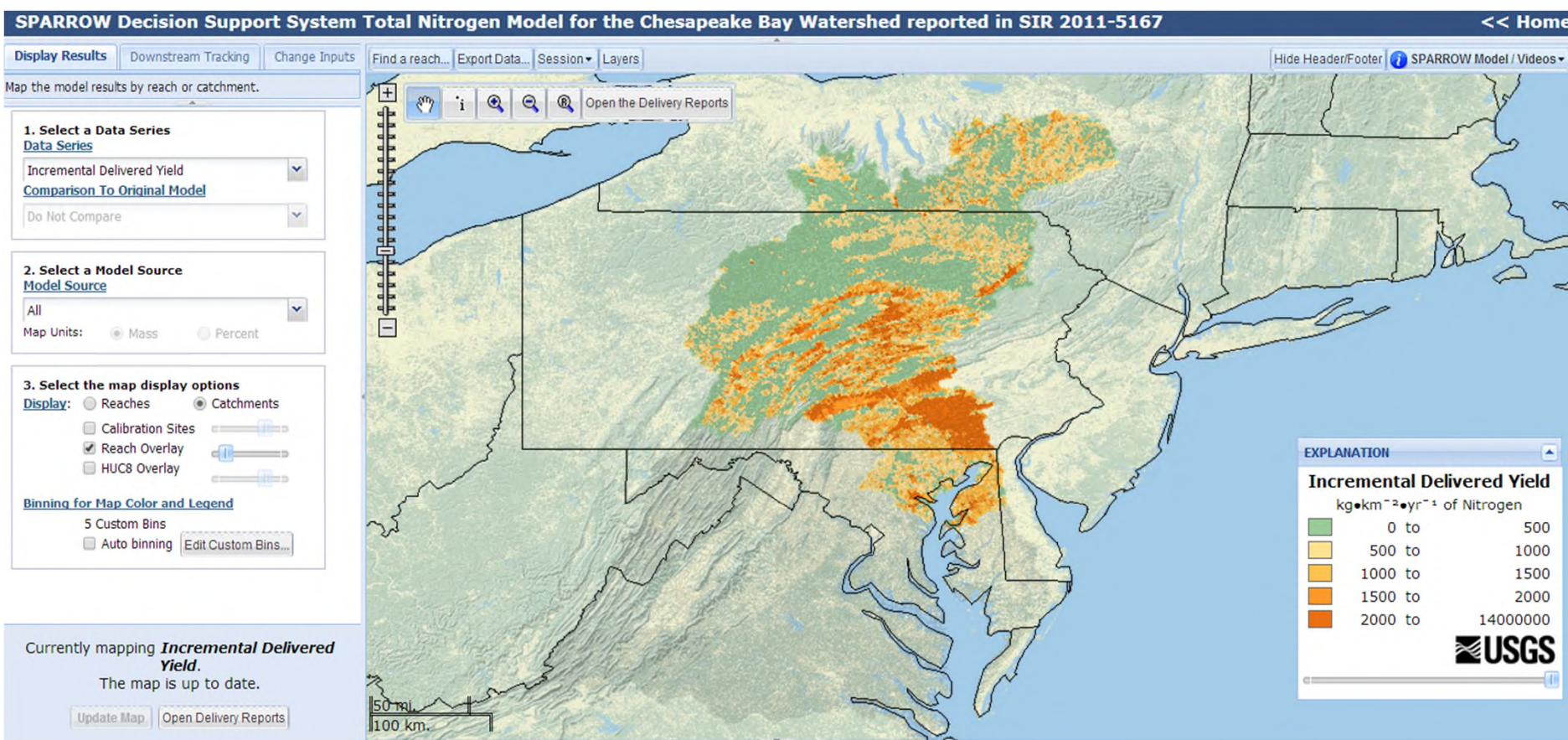
# SPARROW DSS – “Display Results”

## Predicted Nitrogen Yields from Urban Areas



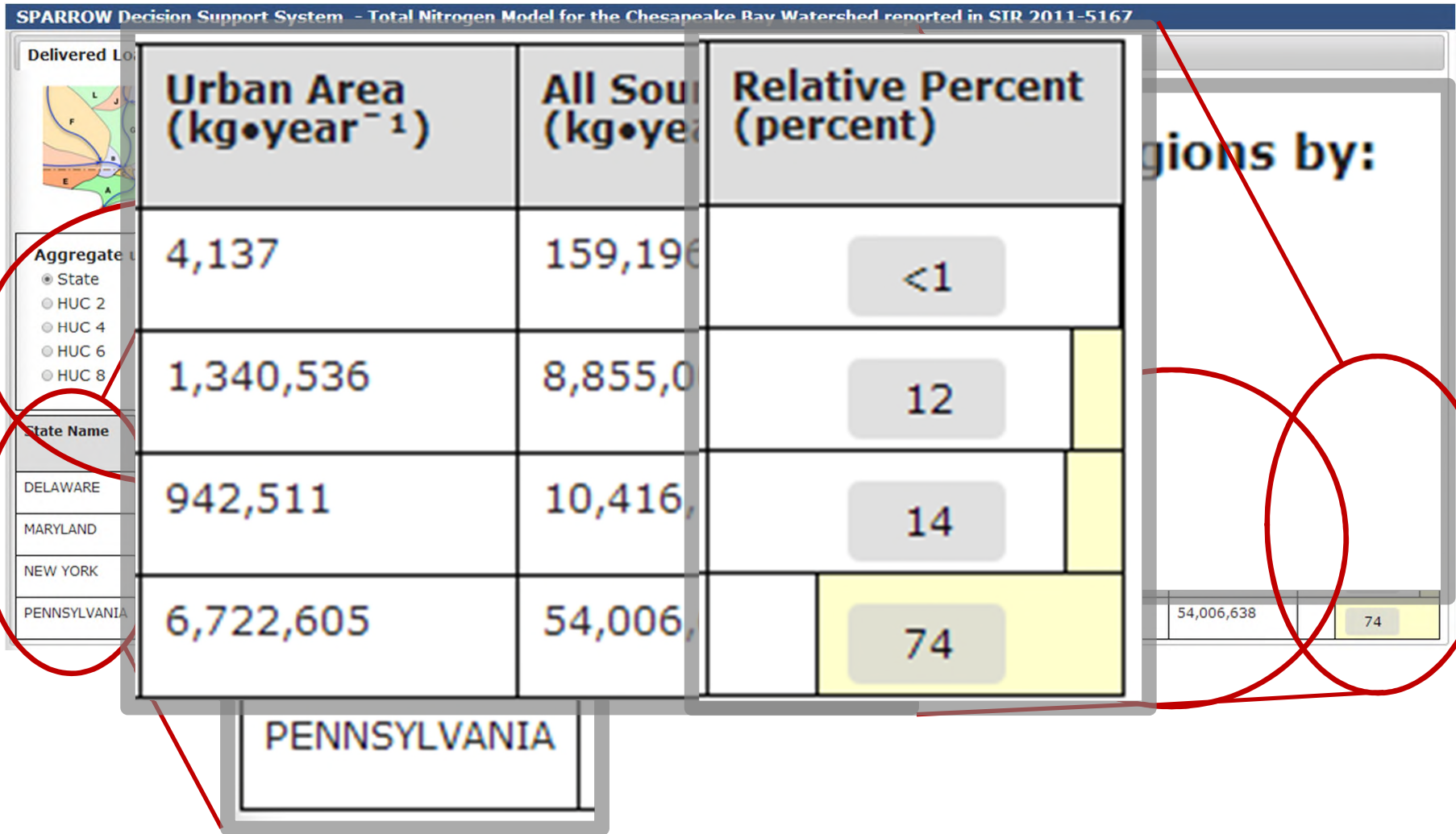


# SPARROW DSS – “Downstream Tracking” Catchment Nitrogen Yields to Estuarine Waters



# SPARROW DSS – “Downstream Tracking”

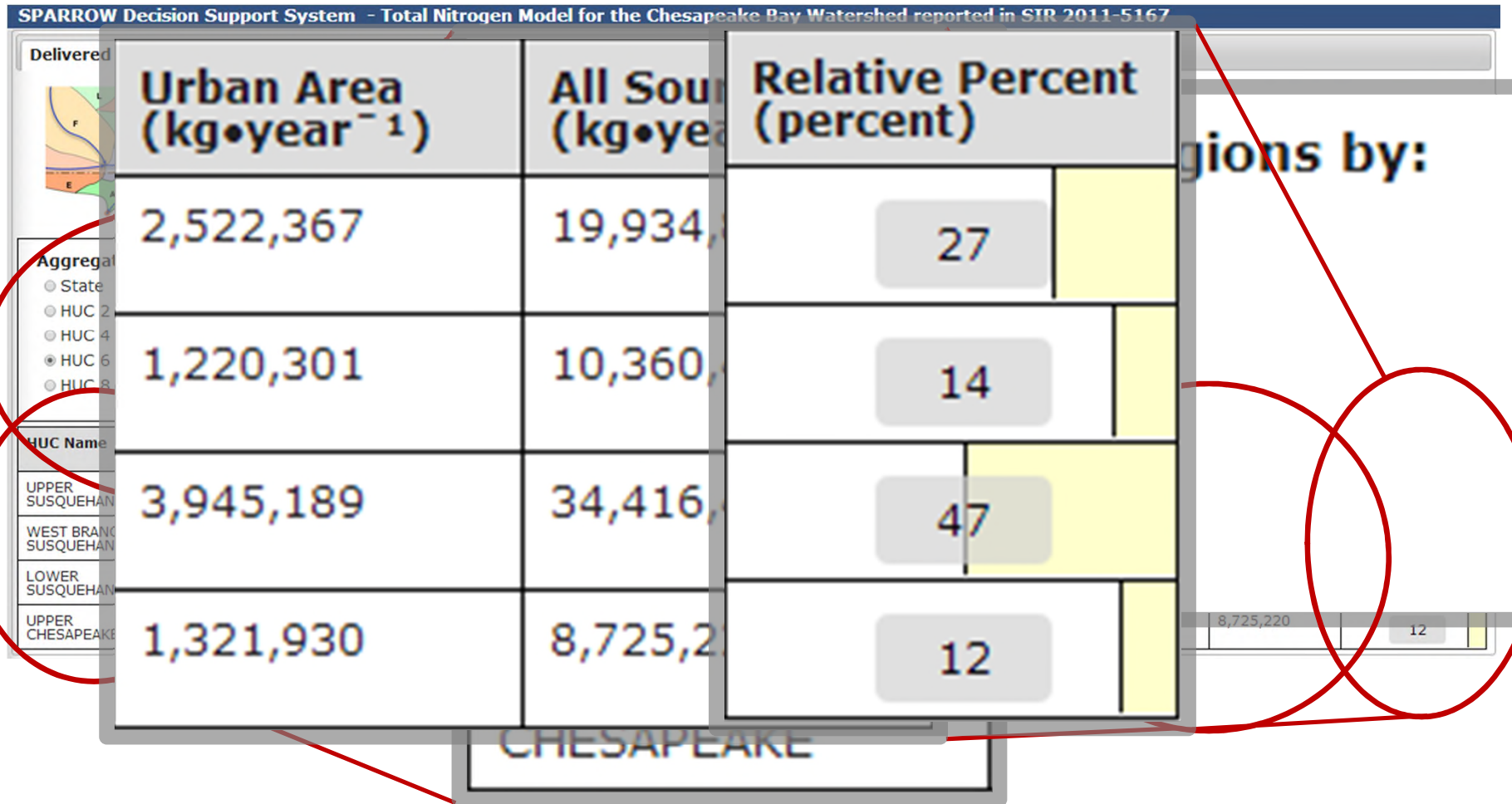
## Summary of Delivered Yields by State





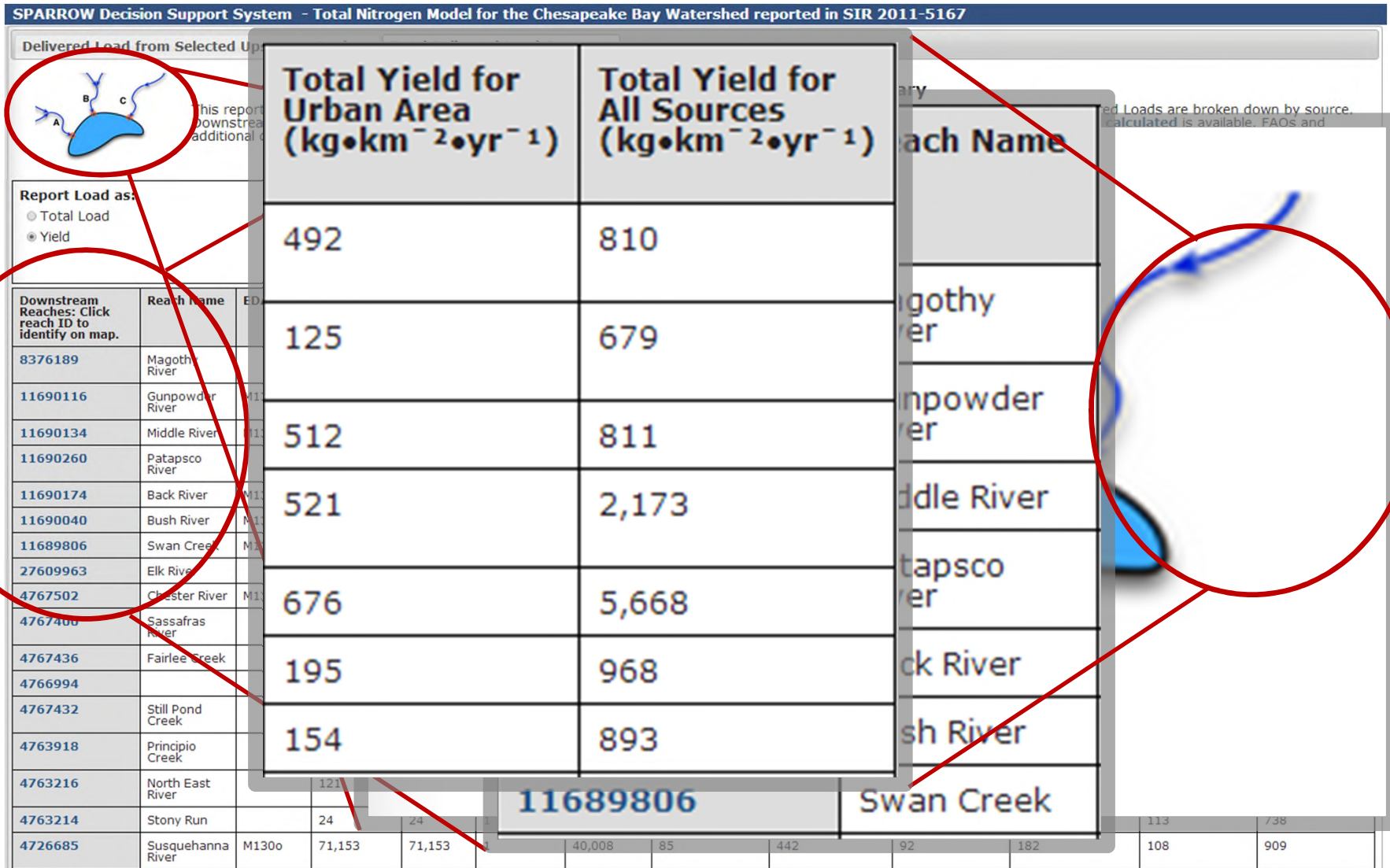
# SPARROW DSS – “Downstream Tracking”

## Summary of Delivered Loads by 6-Digit HUC



# SPARROW DSS – “Downstream Tracking”

## Summary of Delivered Yields by Tributary





# SPARROW DSS – “Change Inputs”

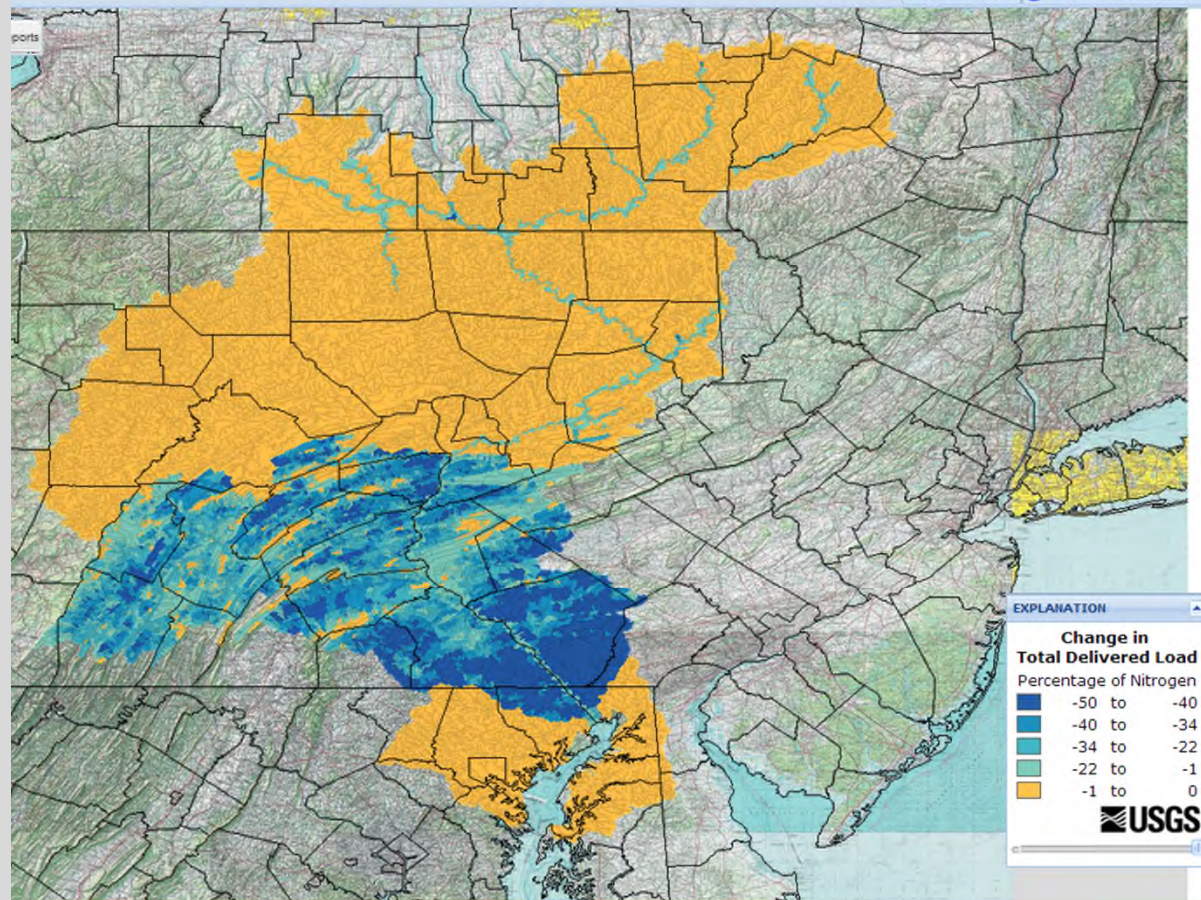
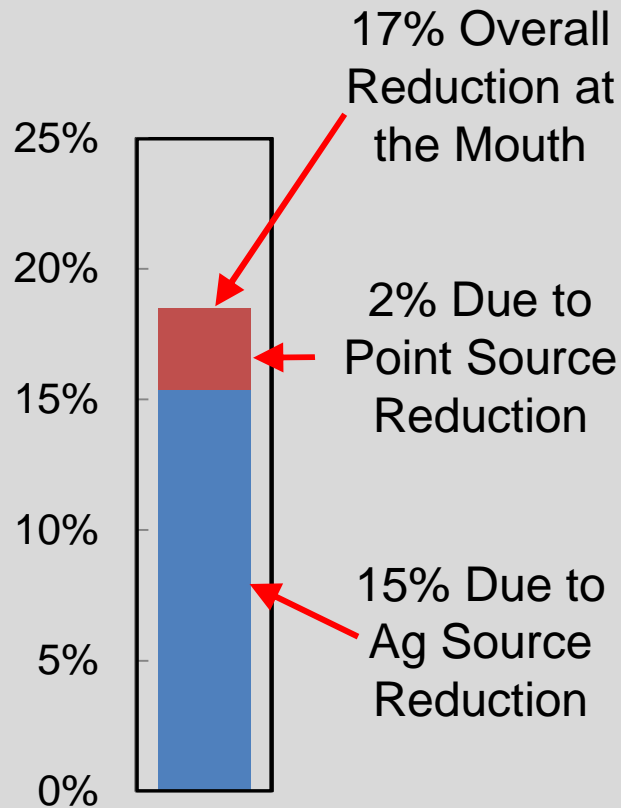
## Nitrogen Reduction Scenario

Upper Susquehanna – 50 % Reduction in Point Source Inputs  
Lower Susquehanna – 50 % Reduction in Agricultural Inputs

SPARROW Decision Support System Total Nitrogen Model for the Chesapeake Bay Watershed reported in SIR 2011-5167

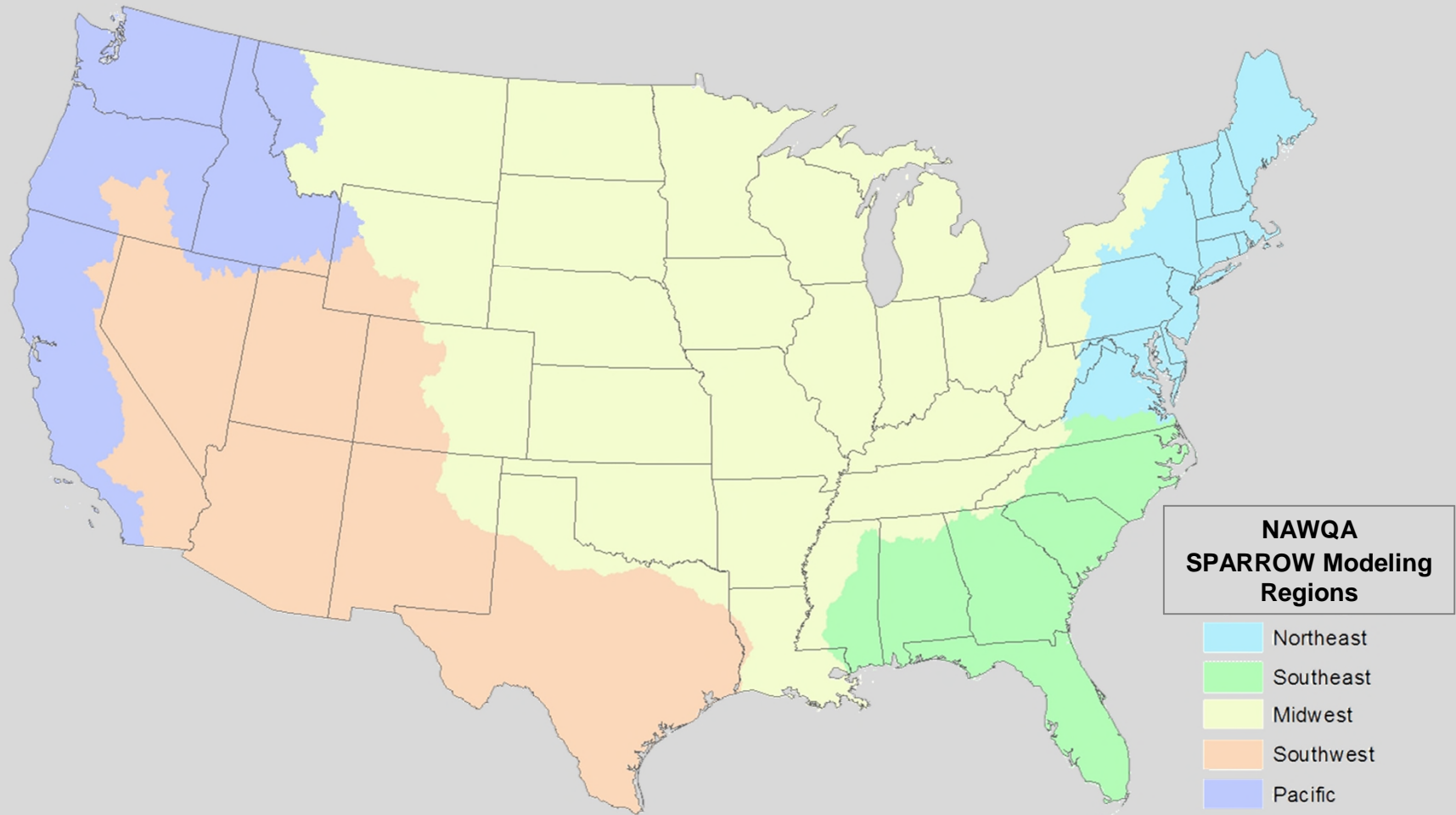
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Hide Header/Footer SPARROW Model / Videos





# SPARROW Model Updates for 2012



# Additional Information



Further Details of SPARROW:

<http://http://water.usgs.gov/nawqa/sparrow>

Nutrient Transport to the Nation's Estuaries:

<http://water.usgs.gov/nawqa/sparrow/estuary>

Decision Support System:

<http://water.usgs.gov/nawqa/sparrow/dss>

Contact Information:

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